



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

$37\frac{1}{2}$ times greater than at present. It can never, therefore, have been reduced to so great an extent by the moon's action on the tides. But since, when the oblateness is small, the rotation area is nearly proportional to the velocity, and the excess of the square of the equatorial above that of the polar axis is nearly proportional to the square of the velocity, this excess may have been originally nearly 18 times as great as at present, or about $15\frac{1}{2}$ per cent of the square of the polar axis. This would correspond to a figure of the earth in which the equatorial radius would have been about $2\frac{1}{2}$ per cent greater than at present; so that it is sufficient to account for the observed phenomenon.

This peculiar form of shrinkage would produce the highest mountains at the equator, and the tendency of the mountain ranges would then be to assume the direction of the meridian. But nearer the poles the mountains would be less elevated, and would rather tend towards the direction of the parallels of latitude.

It is, next, expedient to consider the mechanical question of the loss of living force in the case of the moon's action upon the waters of the earth, and its effect upon their different motions. In this connection there are problems worthy of the attention of Geometers; such as the relative motions of bodies rotating about the same vertical axis, towards which they are drawn by weights, and acting upon each other through the friction on the axis. For one of the bodies a rotating wheel may be substituted. There is also the case of two planets revolving about a primary, and acting upon each other through some form of friction.

In this way, it will be seen that the planet or satellite once formed is constantly removed from the primary, and that planets tend to approach each other. It is interesting to consider whether this may not be one of the actual problems of nature.

Six hundred and ninth Meeting.

May 25, 1869. — ANNUAL MEETING.

In the absence of the regular presiding officers, Hon. Robert C. Winthrop was chosen to take the chair.

The Chairman called the attention of the Academy to the recent decease of Hon. William Mitchell and of Dr. William Allen, both of them Resident Fellows.

It was voted to adjourn this meeting at its close to the second Tuesday in June.

It was voted to adjourn the stated meeting of August to the second Tuesday of September.

Professor Runkle and Mr. Hill were appointed scrutineers of the election of officers, and Professor Watson and Dr. White scrutineers of the election of members.

It was voted to close the polls at five o'clock.

The Treasurer's report, duly audited, was received and ordered to be entered on the records.

Dr. Pickering presented the report of the Library Committee, which was accepted.

The report of the Rumford Committee, presented by Professor Winlock, was accepted, and a recommendation to present the Rumford Premium to George H. Corliss, for his improvements in the Steam-Engine, was adopted.

It was also voted, in accordance with the recommendations of this Committee, "That the sum of one hundred and twenty-eight dollars and fifty-six cents of the income of the Rumford Fund be appropriated for the purchase of certain books for the Library of the Academy.

"That the sum of three hundred dollars be appropriated for the purchase of spectroscopic instruments to be used, under the direction of the Committee, in observing the solar eclipse of August next.

"That one thousand dollars of the income of the Rumford Fund be appropriated for continuing the publication of the new edition of Count Rumford's works which has been begun by the Academy."

Mr. F. W. Putnam addressed the Academy on the approaching meeting, at Salem, of the American Association for the Advancement of Science.

Professor A. Agassiz, Dr. White, and Professor F. H. Storer were appointed a committee to consider what action the Academy should take on the occasion of this meeting.

The following appropriations were voted for the ensuing year : —

For General Expenses, from the General Fund . . .	\$ 2,200
“ “ from the Rumford Fund . . .	200
For Publication	800
For the Library	500

The following gentlemen were elected members of the Academy:—

William T. Brigham, of Boston, to be a Resident Fellow in Class II., Section 1.

Algernon Coolidge, of Boston, to be a Resident Fellow in Class II., Section 1.

Alfred P. Rockwell, of Boston, to be a Resident Fellow in Class I., Section 4.

Alpheus Hyatt, of Salem, to be a Resident Fellow in Class II., Section 3.

Edward S. Morse, of Salem, to be a Resident Fellow in Class II., Section 3.

The annual election resulted in the choice of the following officers for the ensuing year:—

ASA GRAY, *President.*

GEORGE T. BIGELOW, *Vice-President.*

WILLIAM B. ROGERS, *Corresponding Secretary.*

CHAUNCEY WRIGHT, *Recording Secretary.*

CHARLES J. SPRAGUE, *Treasurer.*

FRANK H. STORER, *Librarian.*

Council.

THOMAS HILL,	} of Class I.
JOSIAH P. COOKE,	
JOHN B. HENCK,	
LOUIS AGASSIZ,	} of Class II.
JEFFRIES WYMAN,	
CHARLES PICKERING,	
ROBERT C. WINTHROP,	} of Class III.
GEORGE E. ELLIS,	
ANDREW P. PEABODY,	

Rumford Committee.

JAMES B. FRANCIS,	JOSEPH WINLOCK,
MORRILL WYMAN,	WOLCOTT GIBBS,
WILLIAM B. ROGERS,	JOSIAH P. COOKE,
FRANK H. STORER.	

Committee of Finance.

ASA GRAY,	} <i>ex officio</i> , by statute.
CHARLES J. SPRAGUE,	
THOMAS T. BOUVÉ,	

by election.

The other Standing Committees were appointed on the nomination of the President, as follows :—

Committee of Publication.

JOSEPH LOVERING,	JEFFRIES WYMAN,
FRANCIS J. CHILD.	

Committee on the Library.

FRANCIS PARKMAN,	CHARLES PICKERING,
JOHN BACON.	

Committee to audit the Treasurer's Accounts.

CHARLES E. WARE,	THEODORE LYMAN.
------------------	-----------------

Professor Whitney presented for publication the following letter from Baron Richthofen, giving an account of the geological investigations in China up to March 1, 1869 :—

I returned a few days ago from an exploration of the country adjoining the Yang-tse-kiang, between Shanghai and Han-kau, a distance of six hundred geographical miles. I hired a fine boat, which was towed up the river by steamer, and then dropped gradually downward, exploring right and left from the various stations which I made. The trip, which occupied altogether forty-five days, afforded much of interest, and I believe that I have established a good basis for further operations. You may be surprised that I selected a region which is so easy of

access, and which would hardly seem to be invested with that charm of novelty which remoter portions of this vast Empire might afford. But the excellent charts existing of the lower part of the Yang-tse exhibit only its banks and shallows, while the country immediately adjacent is, with the exception of a few places, even less known than the borders of the upper portion of the river, above Han-kau.

In attempting to give you a brief *résumé* of some of my results, I must remark that I give them only as a preliminary notice, and am quite prepared to see them corrected and enlarged by my own future examinations.

This was the first opportunity I had for getting somewhat acquainted with the sedimentary formations of any part of China. I soon became aware that I must abandon the views taken by my predecessors in Chinese geology, and had better commence from the *a b c*. Mr. Pumpelly's distinction of one great granite-metamorphic formation, one great (Devonian) limestone formation, and one great subdivision embracing the Chinese coal-measures, of which a Triassic age was made probable by Dr. Newberry, was based on observations made in other parts of China. I found it quite insufficient for the country which I visited, while the addition, by Kingsmill, of the Tung-ting sandstones, which he considers to fill out the gap between the granite and the "great limestone formation," was a slight step in advance, but not one by any means representing the variety of formations. The task of establishing their order of succession was not easy, and I had to work hard to accomplish this end. But the amount of evidence increased with the number of good sections, and I had the good fortune to find fossils in several localities, one of which is of some importance, as it yielded a large number and variety of shells in an excellent state of preservation, establishing for the rocks in which they occur the age of the mountain-limestone. These rocks can easily be recognized, and appear to be widely distributed in China.

I give you the list of formations, with the local denomination, which I used in my note-books, and on my geological maps, for convenience' sake only, that I may refer to them in any letter I may send you hereafter. The lowest formation observed is, —

1st. *Ta-ho sandstone*, a series of coarse variegated sandstones, not interrupted, so far as my observations extend, by conglomerates or shales. Red, lilac, purple, green, are the prevailing colors. Some beds are hard, but the greater part of the sandstone is remarkably soft, con-

sidering that it belongs to a very ancient formation. Even where it is inclined at high angles, it retains this soft texture, unless this has undergone a change in the immediate neighborhood of eruptive rocks. The Ta-ho Mountains, a picturesque range of nearly two thousand feet in height, and situated about fifty miles east of Kiu-kiang, are almost entirely built up of these sandstones. They are here slightly inclined, and exposed in a thickness of at least two thousand five hundred feet. At another place I estimated the visible portion of the formation at four thousand feet; but, as I never saw its lowest strata, nor the underlying rocks, those figures mark the minimum of the actual thickness.

2d. *Liu-shan schists*.—This is a series of shales of from twelve hundred to three thousand feet in thickness, which are quite characteristic, being the only rocks of this kind on the lower Yang-tse. The formation appears, from the descriptions given of rocks occurring south of that river, to be largely distributed in eastern China, and to form a valuable horizon. The shales are, for the most part, clayey and sandy, and not unfrequently converted into clay-slate. The color varies from yellow and red in the former to dark green and gray in the latter varieties. An abundance of undeterminable remains of plants may be found. This formation and the former are distinguished from all those of subsequent age, by being usually intersected by numerous veins of white quartz. The Liu-shan is a short but very conspicuous mountain range, near Kiu-kiang, rising abruptly to the altitude of probably little less than three thousand five hundred feet. The shales form a belt at its eastern foot.

3d. *Matsu limestone*.—On the Matsu-shan, a prominent hill in the belt just mentioned, I observed, for the first time, the conformable superposition of limestone on the Liu-shan schists. I confirmed afterwards the observation in several other places. These are dark limestones, distinguished in their lowest portion by a ribboned appearance of all planes of fracture which intersect the stratification. It is caused by the predominance of silica in alternate layers. The main body of the limestone shows a certain brecciated structure and a dolomitic appearance. Chert is abundant, but I found no characteristic fossils. The thickness of the formation is at least two thousand feet; but as I never saw distinctly its upper portion, this figure may be too low. The deposition of these strata was followed by,—

4th. A period of *great disturbances and outbreaks of granite*.—The three formations which I have mentioned compose long ranges of

hills, and I know of one instance only, namely, the Ta-ho range, where they can be observed in an almost undisturbed position; generally they are inclined at steep angles, and contorted. Granite, in most instances, enters into the structure of these ranges, though in a varying way, now intersecting the strata in large intrusive masses and veins, now accompanying them separately. It has, however, had a comparatively slight metamorphosing influence. The purer limestone is converted into a coarse white marble; the impure qualities are represented by thick beds of a highly silicious, slightly dolomitic, and imperfectly crystalline limestone of yellow color. The sandstone is partly converted into quartzite, and the shale into clay-slate.

The granite also occurs by itself in mountain ranges. A bold range, prominent by its rugged outlines, as well as by its altitude (about three thousand five hundred feet), which rises abruptly out of the alluvial plain of the Yang-tse near the large city of Ngan-king, and accompanies the river on its left bank for quite a distance, is completely built up of granite; in a few places only, marble and quartzite indicate detached portions of the strata which were intersected by the granite.

It is probable that this granitic outburst marks one of the main features in the geology of eastern China, as there is little doubt that to it belongs the granite which, together with porphyry, composes almost exclusively the coast of China between Ningpo and Hong-Kong, a distance of seven hundred geographical miles. I observed it at Suchau, in the group of the Chusan Archipelago, and on the island of Hong-Kong. The granite of these three localities resembles that on the lower Yang-tse, not only in its petrographic character, but also in its geological features, as it is accompanied in these different places by detached and quite irregular portions of altered shales and quartzites. These and marble are mentioned, too, from nearly every place along the granitic coast of which I have any information. If the supposition of this identity, or rather contemporaneity, of the granitic outbursts of eastern China should prove correct, we may look for it as a guide in the geology of eastern Asia in general; although I am inclined to believe, from former observations in Shantung, that there was still an older granitic epoch, connected with the thorough metamorphism of a more ancient series of formations than those here mentioned.

5th. *Tung-ting sandstone*.—All the formations which are now to be mentioned were not affected by the disturbances immediately

connected with the outbreak of the granite. Probably the lapse of time between the deposition of 3 and 5 was of long duration, and it is quite likely that the gap may comprise a series of sedimentary deposits which are not visible at the surface in the regions visited by me. I did not even see in any place the lowest portion of the Tung-ting sandstones. They form a rather uniform series of very hard, almost quartzose sandstones, which are visible in a thickness of at least four thousand feet, and form bold mountain ranges for themselves alone, the Liu-shan among others. The name was first used by Kingsmill, and is derived from the island of Tung-ting-shan in Taihu Lake, sixty miles west of Shanghai.

This is the only formation in regard to the position of which I do not feel quite certain. The next formation is, however, conformably underlain by what I consider to be the topmost layers of the Tung-ting sandstone, namely, a series of hardened, nodular clay, hard sandstone, and conglomerate of pebbles of quartz.

6th. *Si-hio limestone*. — This is a limestone formation of only six hundred feet in thickness. The rock is full of chert nodules, and contains numerous fossils, chiefly corals, encrinites, and brachiopods. *Aulopora repens* is of frequent occurrence among them, and other forms, too, indicate a *Devonian* age. The name is derived from a prominent hill, generally known as Single-tree hill, east of Nan-king, where I first found the fossils.

7th. *Nan-king grits*. — The last formation is conformably overlain by a gritty and purely quartzose sandstone, alternating frequently with a coarse conglomerate of perfectly rounded pebbles consisting exclusively of quartz. The color is mostly red, but where the strata are inclined at steep angles, light shades prevail, though the former color is still visible in concentric rings of a dark red color, which give a variegated appearance to every plane of fracture. Although this formation is largely developed at and around Nan-king, and forms bold hills capped with a coarse conglomerate, and rising to more than a thousand feet, I was unable to determine its thickness. It probably far exceeds two thousand feet. Certain dark shales which occur in the way of interstratification contain fossil plants, but I found no specimens that could be determined.

8th. *Kitau limestone*. — This is an important formation, overlaying the last conformably. Its name is derived from a prominent bluff situated midway between Han-kau and Kiu-kiang, called Kitau, or

Cock's Head, which is well known as a landmark to the navigator of the Yang-tse. There are three subdivisions of this formation:—

a. The lower limestone. Hard, silicious varieties of light gray and reddish colors, carrying frequently an abundance of chert, prevail. The thickness of the layers varies from that of card-paper to many feet. The chert nodules increase in some places so much in quantity as to form complete layers by themselves, and lenticular masses of chert are frequently embedded in a soft calcareous sandstone interstratified in thin beds between the limestone. Traces of fossils may often be found in them. The limestone itself is frequently filled with, and in certain layers nearly made up of, the shells of a *Fusulina* which is distinguished from *Fusulina cylindrica* only by its more perfect cylindrical shape. I collected many beautiful specimens of it. This lower limestone is about fourteen hundred feet thick.

b. A series of black sandy shales, black lydite, and soft sandstones. The lowest strata are highly fossiliferous, chiefly at Tso-dsu-kang near Ching-kiang, which is the before-mentioned distinguished locality. Large specimens of *Productus semireticulatus*, with shell, interior structure, and spines well preserved, would be sufficient for themselves to indicate the age of the *mountain-limestone*. They are accompanied by numerous other brachiopods, bivalves, corals, and Fenestellas, the latter being quite a prominent feature. I collected sufficiently to give pleasant occupation to a geologist who would take the trouble to work up the material. The place where they were found is quite a curiosity. There are a number of abandoned shafts, the waste dumps of which afford an easy opportunity for collecting the fossils; otherwise they could hardly be discovered, as the ground is covered by vegetation. As no reason for mining is apparent, it would at first seem as if a past generation had opened the shafts for the delight of future stray geologists, until one hears that these were flint-mines; indeed, lenticular masses of chert are quite frequent in the soft strata. I may mention, besides, that among the fossils here found are none of those brachiopods which have been long since famous as an article of trade in the Chinese drug-stores. I believe, for various reasons, that they are derived from the Si-hio limestone before mentioned. The soft sandstone which follows higher up in this series carries a *bed of coal*, the lowest in position which I have found. All the mines once opened on this bed are abandoned, evidently at or little below water-level. But the coal appears to be of inferior quality, and not more than

one or two feet thick. There is a remarkable regularity in the occurrence of this bed of coal, and of the entire formation, with its lydite and other distinguishing features, over a wide extent of country. I found it in places four hundred miles distant from each other. The thickness of this formation is about four hundred feet.

c. Upper limestone. It is separated from the coal only by a thin stratum of black shale, and is similar in nature to the lower limestone. I observed its thickness for sixteen hundred feet, but never saw its upper portion.

The thickness of the entire formation is thus at least three thousand four hundred feet, but I am prepared to see it proved to be several thousand feet thicker by future observation. The Kitau limestone composes entire mountain ranges by itself alone, chiefly between Kiukiang and Han-kau. Kingsmill mentions, as overlaying the Tung-ting sandstone of the Liu-shan to the west, a limestone formation of an estimated thickness of six thousand feet; it is probably altogether Kitau limestone.

9th. *Sanghu sandstone and conglomerate*.—The deposition of the Kitau limestone ended with a considerable disturbance, as the next formation follows quite unconformably. It consists of quartzose sandstone and quartzose conglomerate, interstratified with thick layers of red clay, and carries a coal-bed at a place sixty miles below Han-kau. Black shales, which overlie the coal, carry some remains of plants. I was unable to establish the thickness of this formation.

10th. *Commencement of the outbreaks of porphyry*.—The porphyritic eruptions have probably continued in China during a long period, while sediments were contemporaneously deposited. Pumpelly was the first to direct attention to these wide-spread events. But it is only in the great granitic region of the eastern coast, between Ningpo and Hong-Kong, that porphyry itself arrives at an extraordinary development. The Chusan Islands are almost exclusively composed of quartzose porphyry and its tufas, and from there southward it appears to be only subordinate in quantity to the granite. I know it from my own observations on the island of Hong-Kong, and by inference from the observations of others, of the region between that island and Ningpo. This is the most extensive development of porphyry known in any part of the world.

11th. *Deposits of porphyritic tufa, sandstones, and clays*.—The porphyries themselves are little developed on the lower Yang-tse. I

noticed their first appearance in certain porphyritic tufas which overlie somewhat unconformably the Sanghu sandstone. The latter appears, indeed, from its purely silicious character, to have been antecedent to any outbreak of porphyry, while the soft and impure nature of all subsequent deposits goes to show that they were the tufaceous sediments of eruptions in remote regions. The visible thickness of this formation below Han-kau is about three thousand five hundred feet. It encloses a few beds of coal of subordinate value.

Herewith ends, on the lower Yang-tse, the series of the ancient formations. The only two horizons which I consider as fairly established are Nos. 6 and 8, the Devonian and the Carboniferous. To the latter belongs the lowest coal-bed, and it is for this reason that I do not consider the question regarding the age of the Chinese coal-measures in any way as settled. It must, on the other side, however, be taken into consideration, that, from a comparison of the formations of the lower Yang-tse with those observed by Pumpelly near Peking, the coal-bearing formation appears to be but very imperfectly represented in the former country. To this circumstance may have to be ascribed the scarcity of workable coal-beds in the region over which my observations extend. It is by no means improbable that the upper beds belong to a different formation not represented in that region.

After a long interruption there were deposited on the lower Yang-tse a series of apparently very recent sediments, the age of which, however, could in no instance be determined.

a. Tatung deposits, a series of hard, cemented sediments of clay, sand, and detritus, which, by the angular shape of the fragments and their petrographical nature, bears evidence of its derivation, at every place, from the next adjoining hills. These strata, though always inclined in a certain direction at angles of from ten to fifteen degrees, do not occupy at any place a higher level than two hundred feet above the river. I did not find any fossils in them.

b. Volcanic rocks. There is, north of Nan-king, a group of extinct volcanoes, whose isolated cones rise immediately out of the alluvial plain to an elevation of five hundred to seven hundred feet. Their lavas are dolerite and basalt. The craters are well preserved.

c. Horizontal beds of gravel. They are probably buried deep underneath the alluvium of the Yang-tse, as the only place where they are exhibited is at the volcanoes of Nan-king. Each of those I visited

is surrounded by a narrow ring of these beds, which are horizontally stratified and form the slopes of the volcanoes up to an altitude of four hundred feet. They probably owe this singularly isolated position to a local elevation of the volcanic district, which may have taken place long after its vents were extinct.

d. Loess, which cannot be distinguished from the European Loess. It composes terraces two hundred feet high, and contains shells of *Helix*. It is sometimes separated from the underlying rocks by a layer of *Laterite*.

e. Alluvium of the great plain.

The different formations here enumerated compose, on the right and left bank of the lower Yang-tse, a series of detached and apparently disconnected mountain ranges. The complete sequence of sedimentary formation can only be constructed out of the various part-sections which those ranges severally afford. But no sooner are the geological columns put down on a map than the unity of the whole system of ranges is conspicuous. They form together, so to say, one great geological range, which is directed from southwest to northeast, parallel to the course of the Yang-tse from Kiu-kiang to Nan-king. There may be distinguished an axial core, consisting of the three most ancient formations and granite, while those of subsequent age are distributed on both flanks of it. On the northwestern flank a somewhat regular sequence of them may be observed, commencing with those following immediately on the granite, and ending with the post-porphyrific deposits. It forms, between the Liu-shan and Han-kau, a belt of one hundred and fifty miles in breadth, and is cut at right angles by the Yang-tse. The hills between Ching-kiang and Nan-king constitute a belt of similar construction, though much more narrow, on the southeastern flank. I use the term "axial core" in a purely geological sense, as the formations composing it do by no means occupy the centre of actual mountain ranges, nor do they excel by the altitude to which they rise. Though the granitic mountains near Ngan-king are about three thousand five hundred feet high, most of the hills composed of those ancient formations would but slightly attract the attention of the topographer. West of Poyang Lake, for instance, the upturned edges of the oldest sediments constitute a low plateau, and rise only in a few hills to about six hundred feet, while the more recent Tung-ting grits compose, in the immediate vicinity, the high and abrupt range of the Liu-shan.

You may be surprised not to find in the above list of formations the nummulitic limestone of Si-Tungting, which I mentioned in a former letter, and which belongs properly to the system of the lower Yang-tse. The reason is, that I will refrain from maintaining my former, perhaps too positive assertion, before the fossils, which have so perfectly the structure of nummulites, shall have been examined by an authority on the subject. The structure of these shells, the occurrence, with them, of certain gastropods which, though hardly determinable (on account of their fragmentary condition), do not have the character of any that are usually found in ancient formations, the state of preservation of the fossils which permits even the color of some bivalves to be recognized, — all this is in strange contradiction with the similarity of the limestone of Si-Tungting to some of the most ancient limestone strata on the Yang-tse. The occurrence of encrinurites, too, in the former, — a fact which I think I forgot to mention in my former letter, — is not in accordance with the Eocene age of the limestone in question. I never found on the lower Yang-tse any fossils resembling those of Si-Tungting.

I am endeavoring to collect data for the geological history of eastern China in recent periods. There is, among others, one very interesting feature in the valley of the lower Yang-tse, which bears on that subject. You would, in ascending the river by steamer, observe that it is, in the greater part of its course below Han-kau, accompanied by terraces, which rise abruptly out of the alluvial plain to an altitude of from sixty to two hundred feet above it, now approaching the river closely, now remaining at a distance of several miles from its banks, sometimes skirting the foot of a mountain range, then again forming an extensive table-land. You might consider them, from analogy, to correspond to the so-called diluvial terraces so common in the valleys of great rivers. It is a striking fact, that, on examination, the terraces of the Yang-tse prove to be quite different in nature, consisting as they do mostly of the upturned edges of ancient formations, not of one of them, but of all, excepting granite, porphyry, and the limestones. The strata are inclined at various angles, and their ends abraded in nearly horizontal planes. On Poyang Lake, the terraces consist of the two most ancient formations (1 and 2); below Han-kau, for sixty miles, they are composed of the soft sandstones and clays No. 11, while near Ngan-king they are built up of Tatung sediments. At Nan-king, finally, the river is accompanied for about fifty miles, on either side, by terraces consisting of the Nan-king sandstones and conglomerates, which are here in-

clined at an angle of forty-five degrees. This phenomenon appears to mark at least one epoch when the sea was gradually encroaching on the land, and, though probably not rising high above its present level, contributing to effect a remarkable change in the configuration of the country. I refrain for the present from any further remarks on recent changes. Only this I may still mention, that I did not discover any signs of former glacial action or drift.

It is much to be regretted that there is not more knowledge of geology to be found among the numerous travellers in China; if there were, our knowledge of the geology of this vast Empire might be rapidly enlarged. I am sorry to say, that, with the exception of Mr. Kingsmill, I have not met one who has any knowledge of this science. I am left quite to myself; and the more I travel, the more I become convinced how little can be done by one man in so vast a country. Still, I hope to be able to lay at least some sort of foundation, which may perhaps guide even those who have not the necessary scientific education, and stimulate further exploration. But more than this I shall hardly be able to accomplish.

Six hundred and tenth Meeting.

June 8, 1869. — ADJOURNED ANNUAL MEETING.

In the absence of the regular presiding officers, Mr. Thomas Sherwin was chosen to take the chair.

The vote of the previous meeting, adjourning the August meeting to the second Tuesday in September, was reconsidered. Professor Joseph Lovering was chosen Corresponding Secretary, and Professor Edward C. Pickering was chosen a member of the Rumford Committee, to fill vacancies made by the resignation of Professor William B. Rogers.

The Council made the following report : * —

During the year which preceded the annual meeting of May, 1869, eight Resident Fellows, three Associate Fellows, and five Foreign Honorary Members have been added to our lists, viz. : —

Captain Nathaniel E. Atwood, of Provincetown, to be a Resident Fellow in Class II., Section 3.

* Unavoidably delayed, and not presented until the meeting of January 26, 1870.